FREAKS OF LIGHTNING EXPLAINED BY EXPERT

Noted Astronomer Tells of Causes of Phenomena Accompanying Electrical Storms.

BY GARRETT P. SERVISS.

"Please explain what causes electricity to explode in the air, and why it does not tear up the ground when it reaches the earth?"—W. B. Goshen, Indiana."

In speaking of the explosion of electricity in the air, I suppose that you refer to such phenomena as the electric spark and lightning. These are not explosions in the ordinary sense of that word, although they often produce explosions and explosive effects.

A strong flash of lightning causes a sudden expansion of the air immediately around it, and the displaced air instantaneously rushes back again to fill the momentary vacuum, thus giving rise to waves of sound which constitute the phenomena of thunder.

The atmospheric effect is very like that produced by the sudden expansion of the air around the muzzle of a cannon as the expanding gases rush out of the bore. The roar of a cannon is analogous to the thunder of a lightning discharge. But there is a difference in the manner in which the air is expanded by lightning and by an expansion of gases.

The former, being a current of electricity, or of electrons, resisted in its passage by a nonconducting, or only partially conducting, medium (the atmosphere), forces its way through the molecules of the air and produces an intense heat, which instantaneously expands the air. There may also be other expansive action due to repulsion between the electrified air particles. In the case of an explosion of gunpowder the air is driven bodily aside to make room for the expanding gases.

Often Makes Small Appearance.

When a lightning bolt strikes the ground its effects are usually manifested only by the formation of a hole in the earth, the existence of which may entirely escape attention, unless the ground is very moist, when there may be an explosion of suddenly-formed steam, making a little excavation.

Ordinarily the only visible effect of lightning upon the soil consists of a tube called a "fulgurite," which may penetrate many inches or many feet into the ground. These tubes are lined with vitrified mineral substance, due, of course, to the great heat which has sufficed instantly to melt the sand and other substances constituting the soil. Moist earth being a good conductor of electricity, the discharge is rapidly conducted away on all sides, and usually without explosive effects.

But the result is often very different if the lightning strikes an object resting on the surface of the earth, such as a house, a tree, or even an isolated rock. Explosive effects are then very common, for there is any moisture present which can be expanded into steam by the sudden accession of heat.

Trunks of Trees Split.

The trunks of trees are occasionally split from end to end by the instantaneous formation of steam inside them, or, more frequently, their bark is blown off, or huge limbs are torn off and flung far away. There is at least one record (in Poggendorff's "Annalen") of the complete annihilation of a tree by a lightning stroke.

One of the most remarkable instances of the effects of the sudden production of steam in the trunk of a tree by the heating effect of lightning is that of a great oak, 85 feet tall, in the forest of Thury, France, whose leaves, within twenty-four hours after it was struck, turned yellow and began to fall off, although the tree bore no apparent marks of the lightning that had killed it. But when the trunk was carefully dissected it was found that each layer of bark and wood had been completely separated from its neighbors, so that "the whole trunk might have been drawn out like the joints of an enormous telescope."

Blew Rock to Fragments.

A micaceous rock more than 100 feet long, ten feet wide and four feet thick, lying on the shore of the Island of Fetlar, in the Shetlands, was struck by lightning and blown into fragments, and one of the fragments, weighing fifty-four tons, was thrown to a distance of fifty yards. This effect was no doubt due to the instantaneous formation of steam in the cracks and between the layers of the rock, where moisture could easily penetrate, owing to the lamellar structure of the mica.

A phenomenon which seems like a real explosion of electricity sometimes attends the appearance of what is called globular lightning. Although, as Professor Sylvanus P. Thompson has said, the accounts of these wonderful "balls of electric fire" may be exaggerated, yet there can be no doubt of their existence. They have sometimes entered inhabited rooms, rolled about the floor or floated through the air and finally passed out of a window, exploding with violence as soon as they reached the outer air.

Evidently there is much yet to be learned about lightning, although it is the own brother of our new mechanical slave, electric power.

What Is a Pessimist?

Harkerton—"I say, Jones! Can you define a pessimist?" Jones—"Yes, he's a man who, when given the choice of two evils, takes both of them!"

Famous Chinese Roulette House Will Become Charity Hospital

(By Associated Press.)

SHANGHAI, June 12.—The great gambling establishment in this city notorious for years under the name of "The Wheel," which originally cost more than $500,000, is to be converted into a charity hospital. The Chinese authorities have announced that they intend to confiscate the huge building which now stands dark and empty. Its owners, however, threaten to fight this program.

Up to about three years ago, when the place was closed by Chinese authorities, "The Wheel" opened near it a smaller roulette establishment, which in turn was closed after a few weeks.

The Far East. It was located in Chinese territory on North Honan Road, a fifteen-minute automobile ride from the heart of the city. In the days when the establishment flourished, three roulette wheels, with six layouts, besides faro and other games, were operated.

After this establishment was closed as the result of the efforts of missionary interests, no open gambling on any large scale was permitted in Shanghai until last fall, when the interests that formerly operated "The Wheel" opened near it a smaller roulette establishment, which in turn was closed after a few weeks.

SILENT LIP EXERCISE USED TO RESTORE LONG LOST VOICES

Simple Form of Vocal Massage Has Proved Successful in Treatment of People Who Had Become Speechless.

PARIS, June 12.—Explaining that Margaret Wilson, daughter of President Wilson, could get back her voice if she would try vocal massage, Madam Gillou, famous French singer, revealed the personality of an extraordinary woman, Clericy du Collet, whose researches have had almost miraculous results in restoring lost voices, although she herself is unable to sing a note.

"Clericy du Collet is an old woman," said Madame Gillou. "As far as I know nothing has been written about her, although innumerable great singers owe their success to her. Her method of voice production was discovered accidentally, but she later developed it by years of research.

"Clericy du Collet was a teacher in Nice, having been abandoned by her husband, and obliged to earn her living and that of her little boy. She was not strong, and being forced to talk—and talk loudly continually—she lost her voice. In absolute despair at having her bread taken away from her, she consulted throat specialists and doctors of all kinds. All agreed that her case was hopeless.

Must Keep Lips Closed.

"On an excursion from Nice to the Italian Riviera, however, she heard of an Italian peasant woman who was said to cure people whose voices were gone. Clericy du Collet decided to see her. The Italian woman made her perform certain exercises with lips closed. Curiously enough, her voice showed signs of returning.

"The Italian woman, who was an uneducated peasant woman, could give no explanation for the development of the voice by this strange method.

But Madame du Collet determined to find the secret of it, and while practicing it herself, began to study medicine and throat affections. She discovered thereby a remarkable method of curing the vocal chords, which has been recognized by the Academy of Science in Paris, and which made M. Gabriel Faure, the famous composer, director of the National Conservatory of Music, appoint Clericy du Collet special teacher of voice production.

Madame du Collet never cared for the official position, however, nor for publicity or renown. She helped all the individuals she came in contact with, but made no effort to reach the public. That is why scarcely any one, outside a small circle of friends, has ever heard of her, although many famous singers owe their success to her.

No Note for Seven Years.

"I, for one, am eternally grateful to Clericy du Collet. For seven years I could not sing a note, after having lost my voice.

"Georgette Leblanc, Maeterlinck's first wife, spoke to me of Madame du Collet. As doctors had given up my voice as hopeless, I thought there could be no harm in trying this method. After three months my speaking voice returned; within a year I could sing again.

"The Italian woman, who was an uneducated peasant woman, could give no explanation for the development of the voice by this strange method.

"The principle consists of exercising the voice with the lips closed. The combinations of sounds which the pupil or patient is required to utter act as tonic and massage on the vocal chords which all, sooner or later, respond to the treatment and soon begin to function normally again.

Tetrazzini May Never Again Be Heard in Song

(By Universal Service.)

LONDON, June 12.—Friends of Mme. Tetrazzini here learn that the world's greatest soprano has lost her voice and will never be able to sing again.

She is now at her villa at Lugano, Switzerland, and is seriously ill. Letters state she is "surrounded by friends, but the nature of the malady that has seized her only permits of the faintest hope."

MOLECULAR WONDERS EXPLAINED BY SCIENTIST

Garrett P. Serviss Tells of Action of Units Which Produce Energy in Matter.

BY GARRETT P. SERVISS.

"To settle an argument, please tell me if the molecules in a piece of iron fly around without hitting each other, or do they fly around and hit each other, thus creating energy to fly around?"—D. K., Perth Amboy.

To begin with, you must abandon your notion that by hitting each other the molecules would "create energy to fly around." Energy cannot be created by collision; it can only be changed in form or distribution.

If you suppose some molecules to be at rest and others in motion, and that the moving molecules strike the motionless ones, then energy will be communicated from the first to the second, but the first will lose as much energy as they impart to the second, and the final result will be that all the molecules in the bit of matter concerned will share the total energy of motion among them.

But your question relates specially to the state of affairs in a piece of solid matter. You are aware, of course, that the same kind of matter is capable of existing in three different forms. It may be either solid, liquid or gaseous, without changing its essential quality.

In every one of these forms it consists of the same constituent molecules, but the motions of the molecules differ according to whether they constitute a solid, a liquid or a gas. In a solid the distances traversed by the molecules is very small. They are said to make very small excursions about their mean positions."

In a liquid the same molecules have greater freedom of motion than in a solid. They slide about, so to speak, and a mass of liquid will take the shape of any vessel that may contain it, but its molecules will not fly out of the top of the vessel. In a gas the same molecules have motion in all directions, and a mass of them can be retained in an open vessel, but must be surrounded and restrained on all sides. It was in view of these facts that Oliver Lodge once made a striking definition of three states of matter, as follows:

Something to Remember.

"A solid has both size and shape. A liquid has size but not shape. A gas has neither size nor shape."

Because the molecules in a solid move over relatively slight distances it is more convenient to call their motion simply vibration. That makes a clearer picture for the mind than to say that they are "flying about." This molecular vibration in solid bodies is, when sufficiently pronounced, evident to our senses in the form of heat.

In other words, the sensation of heat is caused by the motions, or vibrations, of the molecules of the body concerned. Technically, every mass of matter possesses a certain degree of heat, though it may be inappreciable as heat to our senses.

A body whose molecules were absolutely motionless would have no heat, or would be at the absolute zero of temperature and just what the phenomena presented by such a body would be we do not know, because we have no example of anything that is entirely destitute of molecular motion. Absolute zero has never been experimentally attained.

Returning to your piece of iron, suppose that, at first, you take it in your hand when it is at the ordinary temperature of its surroundings. It does not, then, give you any indication of the vibration, or agitation, of its molecules, although we know that they are not at rest.

Next, put one end in the fire, and after a time the increased agitation of the molecules, caused by the heat communicated from the fire, will spread along the iron until it reaches your hand and perhaps will make you drop the iron because of the burning sensation. Heat the iron still more, and it will become "red hot," afterward "white hot," and it may even be melted, and so changed from the solid to the liquid state.

Vibratory Increase.

This is accomplished simply by increasing the molecular vibration until the molecules are freed from the rigid limitation of movement that restrains them when in the solid state, and are endowed with the comparative freedom that characterizes the molecules of a liquid. But this is not the end, for by imparting a still higher temperature to the iron you may even turn it into a vapor, or gas, and then it will expand in every direction, except as it may be restrained by force from outside.

In the sun iron exists in enormous quantities, not as a solid, and probably never as a liquid, but only in the gaseous state, with its molecules truly "flying about," and only restrained from skipping off into space by the gravitation of the sun, which keeps them floating about it as "iron clouds."

Vain Regrets.

"Now, young sir, what is it you want?" said an old woman who kept a toffee-stall to a little boy. "Nothing, missus," replied the lad. "I just came to see what I might have got if I hadn't lost my penny!"

An Unseen Peril.

Mingleton—There's alcohol in almost everything. There's alcohol in the very bread we eat!

Bowles—Alcohol in bread?

Mingleton—Yes. I've seen men get intoxicated by drinking toasts!

Historic Bermuda Plans Celebration

Visit of Prince of Wales Occasion for Tercentenary.

[By Associated Press.]

HAMILTON, BERMUDA, June 12.—Bermuda, the oldest remaining British "plantation," is preparing to celebrate its tercentenary this autumn, for which purpose 12,000 have been appropriated. Since the Prince of Wales announced the other day that he meant to pay a call on his loyal subjects, they hit on the scheme of combining two festive occasions and having one grand affair on October 7, when the Renown, with the heir to the throne aboard, is to cast anchor here.

It was August 1, 1620, that the Colonial Parliament held its first sitting, but as the royal engagements cannot very well be altered, it was thought wise to set back the gala date.

For nearly 300 years the business of governing this little outpost of the empire has gone on under the same forms without material change. It is but natural that the 20,000 inhabitants of this twenty square miles of coral rock should wish to honor their aged constitution.

Originally founded by a shipwrecked company under Sir George Somers, destined for Virginia in 1609, the islands have remained continuously under British rule.

Revenues are raised chiefly from tariff duties. No land taxes are levied by the colony. There is a very light tax on realty in the parishes; and the proceeds are used for maintenance of the poor.

There are no divorce laws in Bermuda, and only one breach-of-promise case was ever tried here. Most of the cases on the calender involve bicycle stealing, assault, petty theft. There is little serious crime, though in a region where every one rides a wheel the theft of a bicycle is regarded somewhat as horse stealing was in the West a few years ago.

There are old-timers here who have never set eyes on a train or a trolley car, but of late they have had the satisfaction of seeing flying-boats circling through the air.

Innovations of any kind are apt to be looked on with some suspicion. The majority is conservative, and that is perhaps why so much sentiment is attached to the coming celebration of the 300-year-old Constitution.

An Old Brand.

A street boy was puffing at the end of a cigar when a portly man, thinking to have a little fun at the youth's expense, asked him if he often smoked cigars.

"Oh, yes, sir, pretty often," answered the youth.

"What brand do you generally smoke?"

"Robinson Crusoe, sir," replied the boy.

The man pondered a while. "I never heard of that brand," he said.

"It's a name I've given 'em myself," said the youth. "You see, guv'nor, old Crusoe was a castaway, and so are my cigars!"